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# Modeling the Spatial and Temporal Variability in Land Surface Energy Budget over East China

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**Abstract:** Accurate representation of surface energy partitioning is crucial to climate estimation and prediction. Both latent and sensible heats are important surface energy components that directly drive climate variations. By adequately distinguishing energy flux components into latent and sensible heats, we could determine the water vapor and heat content in the atmosphere and better understand the regional and global scale climatologic processes. Therefore, assessing the spatial and temporal variation of land surface energy exchange would increase our knowledge of the interactions between terrestrial ecosystem and environmental changes, and thus get well known of climate change. In this study, surface energy partitioning across the east China for four periods over the past 30 years were investigated using a process-based land surface model (EASS), and the spatiotemporal distributions of land surface energy partitioning patterns were assessed under the comprehensive effects of climatic variability and land cover change. In control runs, there were obvious spatial and temporal variability in sensible heat flux (H) and latent heat flux ($\lambda$E). Over the past 30 years, the area with high H value had been expanding except the year of 2000 (even lower than that in later 1980s), the area of high-value distribution was increased and mainly distributed in Shandong, Hebei and Henan provinces. There was a contiguous high-value distribution in northeast of China in 2005 with the maximum value up to about 100 W/m$^2$, whereas $\lambda$E had an opposite trend and did not change obviously as much as the H spatial distribution. For the regional average annual seasonal variation, the peak value of H (about 50 W/m$^2$) appeared in March and April, the lowest value appeared in June and July (about 15 W/m$^2$), and a small peak showed up again in November (about 27 W/m$^2$). However, $\lambda$E had only one peak which appeared in June and July (about 100 W/m$^2$). Furthermore, we conducted sensitivity analysis on regional heat fluxes and concluded that the seasonal changes, especially H, were mainly affected by land cover change, while the interannual variability of heat fluxes were mainly controlled by climatic factors. The results of this study can provide a basis and reference to climate change adaptation.